



DES-3208 10/100 Fast Ethernet Switch User's Guide

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ABOUT THIS GUIDE

This User's guide tells you how to install your DES-3208, how to connect it to your Fast Ethernet network, and how to set its configuration using the built-in console interface.

Terms

For simplicity, this documentation uses the terms “Switch” (first letter upper case) to refer to the DES-3208 10/100 Fast Ethernet Switch, and “switch” (first letter lower case) to refer to all Ethernet switches, including the DES-3208.

Overview of this User's Guide

- ◆ Chapter 1, *Introduction*. Describes the switch and its features.
- ◆ Chapter 2, *Unpacking and Setup*. Helps you get started with the basic installation of the switch.
- ◆ Chapter 3, *Identifying External Components*. Describes the frontpanel, rear panel and LED indicators of the switch.
- ◆ Chapter 4, *Connecting the Switch*. Tells how you can connect the DES-3208 to your Fast Ethernet network.

- ◆ Chapter 5, *Switch Management*. Talks about Local Console Management via the RS-232 DCE console port and other aspects about how to manage the Switch.
- ◆ Chapter 6, *Using the Console Interface*. Tells how to use the built-in console interface to change, set and monitor Switch performance and security.
- ◆ Appendix A, *Technical Specifications*. Lists the technical specifications of the DES-3208.
- ◆ Appendix B, *RJ-45 Pin Specifications*. Shows the details and pin assignments for the RJ-45 receptacle/ connector.
- ◆ Appendix C, *MII Port Specifications*.

1

INTRODUCTION

This section describes the features of the DES-3208, as well as giving some background information about Ethernet/ Fast Ethernet switching technology.

Fast Ethernet Technology

The growing importance of LAN s and the increasing complexity of desktop computing applications are fueling the need for high performance networks. A number of high-speed LAN technologies are proposed to provide greater bandwidth and improve client/server response times. Among them, Fast Ethernet, or 100Base-T, provides a non-disruptive, smooth evolution from the current 10Base-T technology. The non-disruptive and smooth evolution nature, and the dominating potential market base, virtually guarantee cost effective and high performance Fast Ethernet solutions in the years to come.

100Mbps Fast Ethernet is a new standard specified by the IEEE 802.3 LAN committee. It is an extension of the 10Mbps Ethernet standard with the ability to transmit and receive data at 100Mbps, while maintaining the CSMA/CD Ethernet protocol. Since the 100Mbps Fast Ethernet is compatible with all other 10Mbps Ethernet environments, it provides a straightforward upgrade and takes advantage of the company's existing investment in hardware, software, and personnel training.

Switching Technology

Another approach to pushing beyond the limits of Ethernet technology is the development of Switching technology. A switch bridges Ethernet packets at the MAC address level of the Ethernet protocol transmitting among connected Ethernet or fast Ethernet LAN segments.

Switching is a cost-effective way of increasing the total network capacity available to users on a local area network. A switch increases capacity and decreases network loading by making it possible for a local area network to be divided into different *segments* which don't compete with each other for network transmission capacity, giving a decreased load on each.

The switch acts as a high-speed selective bridge between the individual segments. Traffic that needs to go from one segment to another is automatically forwarded by the switch, without interfering with any other segments. This allows the total network capacity to be multiplied, while still maintaining the same network cabling and adapter cards.

For Fast Ethernet networks, a switch is an effective way of eliminating problems of chaining hubs beyond the "two-repeater limit." A switch can be used to split parts of the network into different collision domains, making it possible to expand your Fast Ethernet network beyond the 205 meter network diameter limit for 100BASE-TX networks. Switches supporting both traditional 10Mbps Ethernet and 100Mbps Fast Ethernet are also ideal for bridging between existing 10Mbps networks and new 100Mbps networks.

Switching LAN technology is a marked improvement over the previous generation of network bridges, which were characterized by higher latencies. Routers have also been used to segment local area networks, but the cost of a router and the setup and maintenance required make routers relatively impractical. Today's switches are an ideal solution to most kinds of local area network congestion problems.

Features

The DES-3208 Switch was designed for easy installation and high performance in an environment where traffic on the network and the number of users increase continuously.

The DES-3208 Switch features:

Ports

- ◆ 8 high performance N-way ports all operating at 10/100 Mbps for connection to servers and hubs. All ports can be auto-negotiated between 10Mbps/ 100Mbps, Half-duplex or full duplex connections.
- ◆ Uplink/ MDI-II (media dependent interface) port for uplink to another switch, hub or repeater.
- ◆ RS-232 DCE console port for diagnosing the Switch via a connection to a PC and Console/ Out-of-band management.
- ◆ MII (Media Independent Interface) flexible media connection port for connection to different physical layer devices (e.g. fiber)

Performance features

- ◆ Store and forward switching scheme capability to support rate adaptation and protocol conversion.
- ◆ Full and Half-duplex (for both 10Mbps and 100Mbps) to allow two communicating stations to transmit and receive at the same time.
- ◆ Auto polarity detection for correction of incorrect polarity on the receive twisted pair at each port.

- ◆ Data forwarding rate 14,880 pps per port at 100% of wire-speed for 10Mbps speed.
- ◆ Data forwarding rate 148,800 pps per port at 100% of wire-speed for 100Mbps speed.
- ◆ Data filtering rate eliminates all error packets, runts, etc. at 14,880 pps per port at 100% of wire-speed for 10Mbps speed.
- ◆ Data filtering rate eliminates all error packets, runts, etc. at 148,800 pps per port at 100% of wire-speed for 100Mbps speed.
- ◆ 8K active MAC address entry table per device with self learning and table aging.
- ◆ 8 MB packet buffer per device.
- ◆ Supports broadcast storm rate filtering.

Management

- ◆ RS-232 console port for out-of-band network management via a PC.
- ◆ Spanning Tree Algorithm Protocol for creation of alternative backup paths and prevention of indefinite network loops.
- ◆ D-View Network Management Program for standard SNMP-based management.
- ◆ Fully configurable either in-band or out-of-band control via SNMP based software.
- ◆ Flash memory for software up-grade. This can be done in-band via BOOTP/TFTP. D-View or out-of-band console can also initiate a download request.
- ◆ Built-in SNMP management: MIB-I (RFC 1156), MIB-II (RFC 1213), Bridge MIB (RFC 1268) and D-Link proprietary MIB.

2

UNPACKING AND SETUP

This chapter provides unpacking and setup information for the Switch.

Unpacking

Open the shipping carton of the Switch and carefully unpack its contents. The carton should contain the following items:

- ◆ One DES-3208 10/100 Fast Ethernet Switch
- ◆ Accessory pack: 2 mounting brackets and screws
- ◆ Four rubber feet with adhesive backing
- ◆ 1 AC power cord
- ◆ This user's guide with Registration Card
- ◆ Diskette containing management software

If any item is found missing or damaged, please contact your local D-Link Reseller for replacement.

Setup

The setup of the Switch can be performed using the following steps:

- ◆ The surface must support at least 3 Kg.
- ◆ The power outlet should be within 1.82 meters (6 feet) of the device.
- ◆ Visually inspect the power cord and see that it is secured fully to the AC power connector.
- ◆ Make sure that there is proper heat dissipation from and adequate ventilation around the Switch. Do not place heavy objects on the Switch.

Desktop or Shelf Installation

When installing the Switch on a desktop or shelf, the rubber feet included with the device must be first attached. Attach these cushioning feet on the bottom at each corner of the device. Allow enough ventilation space between the device and the objects around it.

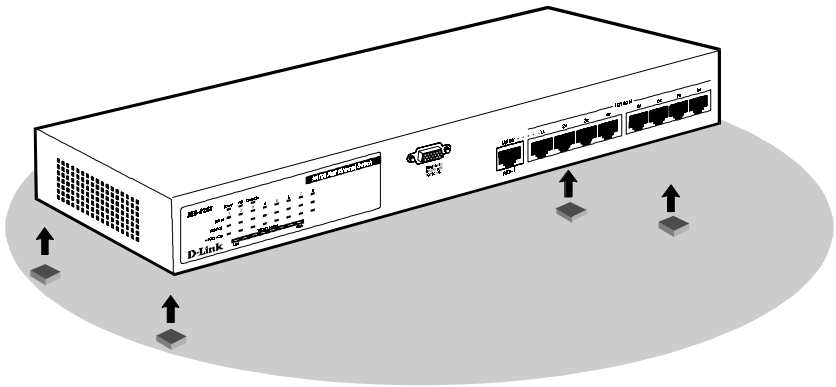


Figure 2-1. 10/100 Fast Ethernet Switch installed on a Desktop or Shelf

Rack Installation

The DES-3208 can be mounted in an EIA standard size, 19-inch rack, which can be placed in a wiring closet with other equipment. To install, attach the mounting brackets on the switch's front panel (one on each side) and secure them with the screws provided.

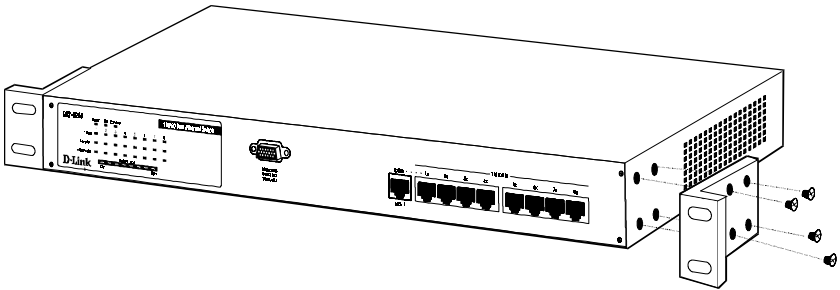


Figure 2- 2A. Attaching the mounting brackets to the 10/100 Fast Ethernet Switch

Then, use the screws provided with the equipment rack to mount the Switch in the rack.

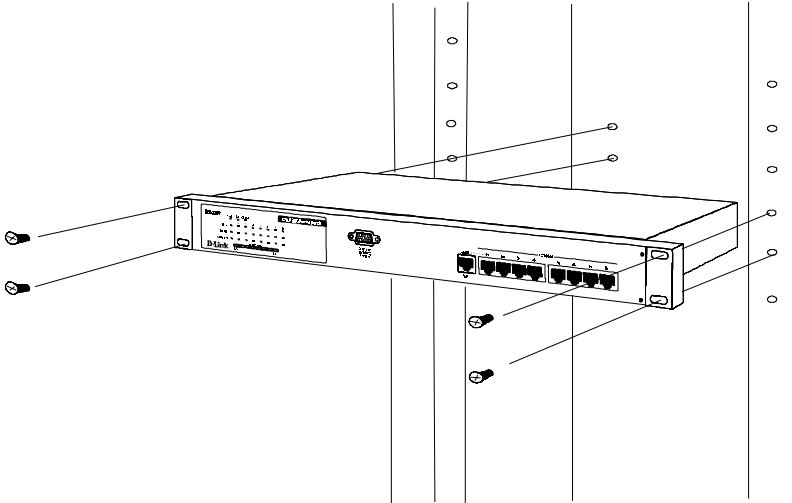


Figure 2-2B. Installing the 10/100 Fast Ethernet Switch in an equipment rack

Power on

The DES-3208 Switch can be used with AC power sources 100 - 240 VAC, 50 - 60 Hz. The power switch is located at the rear of the unit adjacent to the AC power connector and the system fan. The Switch's power supply will adjust to the local power source automatically and may be turned on without having any or all LAN segment cables connected.

After the power switch is turned on, the LED indicators should respond as follows:

- ◆ All LED indicators will momentarily blink. This blinking of the LED indicators represents a reset of the system.

- ◆ The FDX/Col LED indicators blink from **yellow** to **green**.
- ◆ The power LED indicator will light yellow while the switch loads onboard software and performs a self-test. After approximately 20 seconds, the LED will light green to indicate the switch is in a ready state.
- ◆ The console LED indicator will remain *ON* if there is a connection at the RS-232 port, otherwise this LED indicator is *OFF*.
- ◆ The MII LED indicator will remain *ON* if there is a connection at the MII port, otherwise this LED indicator is *OFF*. If there is an active connection at the MII port, The MII LED, and the 100M and Link/Act LED indicators for port 2x will remain ON, otherwise the Link/Act LED indicators are OFF. The 100M LED indicator may remain ON or OFF depending on the transmission speed.
- ◆ The System Load LED indicators will momentarily blink.

Power Failure

As a precaution, the Switch should be turned **OFF** in case of power failure. When power is resumed, turn the Switch ON. At all times, avoid leaving the Switch ON after the occurrence of a power failure.

3

IDENTIFYING EXTERNAL COMPONENTS

This chapter describes the front panel, rear panel and LED indicators of the Switch

Front Panel

The front panel of the Switch consists of 8 (10/100 Mbps) MDI-X ports, 1 uplink (MDI-II) port, a RS-232 communication port and LED indicators.

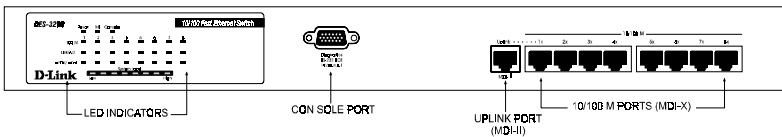


Figure 3-1. Front panel view of the DES-3208 Switch

- ◆ 8 high performance N-way (MDI-X) ports all operating at 10/100 Mbps for connection to servers and hubs. All ports can be auto-negotiated between 10Mbps or 100Mbps.

- ◆ Port 2x (Port number two) is a shared connection with the (Media Independent Interface) MII port in the back of the Switch. Note that, whenever there is a connection at the MII port, port 2x is unavailable for connection to other devices.
- ◆ Uplink/ MDI-II (media dependent interface) port for uplink to another switch, hub or repeater.
- ◆ RS-232 DCE console port for diagnosing the Switch via a connection to a PC and Local Console Management.
- ◆ Comprehensive LED indicators that display the conditions of the Switch and status of the network. A description of these LED indicators follow (see *LED Indicators*).

Rear Panel

The rear panel of the Switch consists of a power switch, an AC power connector, system fans and MII port. The following shows the rear panel of the Switch.

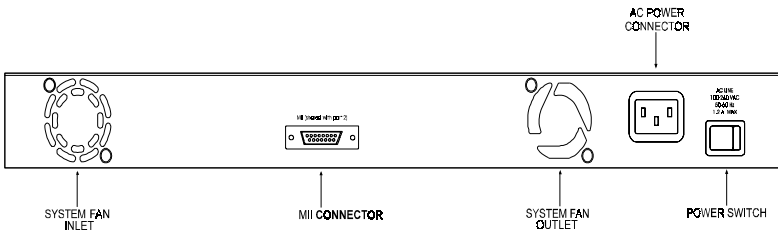


Figure 3-2. Rear panel view of the DES-3208

- ◆ **Power Switch.** This turns the Switch on and off. To turn on the system, press the switch to the "1" position; to turn off, press the switch to the "0" position.

- ◆ **AC Power Connector.** This is a three-pronged connector that supports the power cord. Plug in the female connector of the provided power cord into this connector, and the male into a power outlet. Supported input voltages range from 100 ~ 240 VAC at 50 ~ 60 Hz.
- ◆ **System Fan.** These fan are used to circulate air inside the Switch and also to dissipate heat. The sides of the system also provide heat vents to serve the same purpose. Do not block these openings, and leave adequate space at the rear and sides of the Switch for proper ventilation. Be reminded that without proper heat dissipation and air circulation, system components might overheat, which could lead to system failure.
- ◆ **MII Connector.** The MII (Media Independent Interface) interface connector is a 40 pin connector for use with flexible media (e.g. fiber cable).

This connector has a shared connection with port 2x, and when connected, the MII connector takes operational precedence over port 2x.

- ◇ If you are using a 100BASE-FX Transceiver, This connector is used for connection between two independent locations up to a distance of **two kilometers**.
- ◇ If you are using a 100BASE-TX Transceiver, this connector is used for connection between two independent location up to a distance of **100 meters**.

When you are connecting a 100BASE-FX or TX Transceiver to the MII connector prior to making cable connections, make sure that the 100BASE-FX or TX Transceiver address setting is set to “2,” (See the Transceiver manufacturer user’s guide for more information). The pin specifications for this connector appear in *Appendix C*

Note: *When making cable or transceiver connections to the MII inteface connector, make sure that*

the the Switch is **turned off** after connecting turn the Switch on. When disconnecting a cable or transceiver from the MII interface connector, **turn off** the Switch then disconnect the cable or transceiver.

LED Indicators

The LED indicators of the Switch include Power, MII, Console, 100 M, Link/Act FDX/Col and System Load. The following shows the LED indicators for the Switch along with an explanation of each indicator.

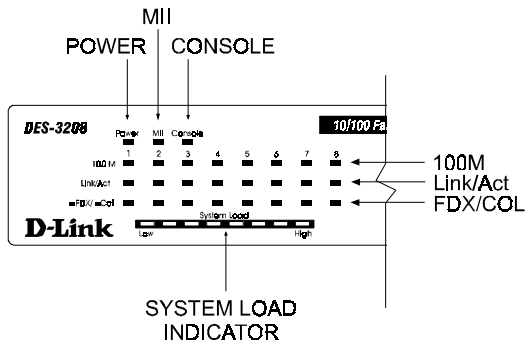


Figure 3-3. The DES-3208 Switch LED indicators

- ◆ **Power.** After turning on the power, the Power indicator, on the front panel, should light yellow to indicate the switch is loading onboard software and performing a self-test. After approximately 20 seconds, the green LED lights to indicate the ready state of the switch.
- ◆ **MII.** The MII (Media Independent Interface) is used for connection between two independent locations up to a distance of two kilometers.

After the system's initial check and power is on, this LED indicator is **ON (green)** when a secured connection is established at the port, otherwise it is **OFF**.

- ◆ **Console.** This LED indicator is lit when the switch is being managed via out-of-band/ local console management through the RS-232 console port using a straight-through serial cable. When a secured connection is established, this LED indicator is lit *green*. Otherwise, it is OFF.
- ◆ **100 M.** These LED indicators are illuminated (*green*) when a 100 Mbps device is connected to any of the 8 ports or uplink port. If a 10 Mbps device is connected to any of the 8 ports or uplink port, these LED indicators are **OFF**.
- ◆ **Link/Act.** These LED indicators are lighted up (*green*) when there is a secure connection (or link) to a device at any of the ports. The LED indicators blink (*green*) whenever there is reception or transmission (i.e. Activity--Act) of data occurring at a port.
- ◆ **FDX/Col.** This LED indicator is *green* when a respective port is in full duplex (FDX) mode. Otherwise, it is OFF for half duplex (HDX) operations. It blinks *yellow* when collisions are occurring on the respective port.
- ◆ **System Load.** Indicates the current traffic load on the Switch. The system load bar provides a quick reference of the current traffic load relative to the capacity. It is a measure of the number of packets traversing within the device. Only valid packet and transmit packet are counted. The first six LED indicators are *green*; the last two LED indicators are *yellow*.

4

CONNECTING THE SWITCH

This chapter describes how to connect the DES-3208 to your Fast Ethernet network.

PC to Switch

A PC can be connected to the Switch via a two-pair Category 3, 4, 5 UTP /STP straight cable. The PC (equipped with a RJ-45 10/100 Mbps jack) should be connected to any of the eight ports (1x - 8x) of the DES-3208.

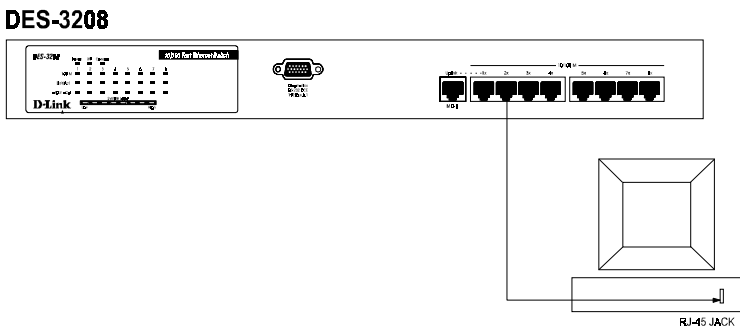


Figure 4-1. DES-3208 Switch connected to a PC or Workstation

The LED indicators for PC connection are dependent on the LAN card capabilities. If LED indicators are not illuminated after making a proper connection, check the PC's LAN card, the cable, Switch conditions and connections.

The following are LED indicator possibilities for a PC to Switch connection:

1. The 100M LED indicator comes ON for a 100 Mbps and stays OFF for 10 Mbps.
2. The Link/Act LED indicator lights up upon hookup.
3. The FDX/Col LED indicator depends upon LAN card capabilities.

Hub to Switch

- ◆ A 10Base-T hub can be connected to the Switch via a two-pair Category 3, 4 or 5 UTP/STP straight cable.
- ◆ A 100Base-TX hub can be connected to the Switch via a two-pair Category 5 UTP/STP straight cable.

The connection is accomplished from the hub's uplink (MDI-II) port to any of the Switch's (MDI-X) ports 1x - 8x of the DES-3208.

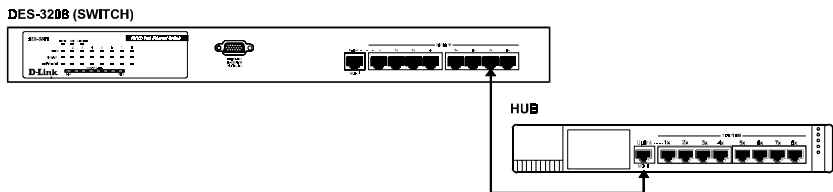


Figure 4-2. DES-3208 Switch connected to a 10BASE-T or 100Base-TX Hub

10Base-T Hub

For a 10 Base-T hub, the Switch's LED indicators should illuminate the following:

- ◆ 100M LED speed indicator is *OFF*.
- ◆ Link/Act indicator is *ON*.
- ◆ FDX/Col indicator is *OFF*.

100Base-TX Hub

For a 100Base-TX hub, the Switch's LED indicators should illuminate the following:

- ◆ 100M LED speed indicator is *ON*.
- ◆ Link/Act is *ON*.
- ◆ FDX/Col LED indicator is *OFF*.

Hub without Uplink (MDI-II) port

If a hub is not equipped with an uplink (MDI-II) port, then connection can be made using either straight cable or crossover cable (see *Appendix A, Technical Specifications* for cable requirements).

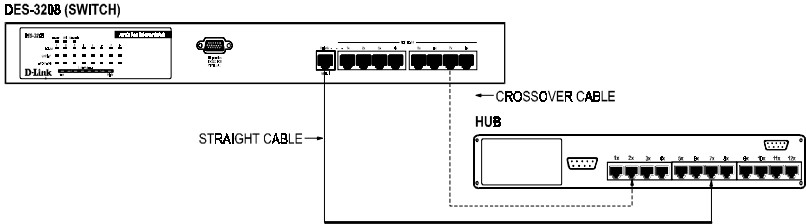


Figure 4-3. DES-3208 Switch connected to a Hub without uplink (MDI-II) port using the Straight OR crossover cable option

Using straight cable

When using straight cable, the connection can be made from the uplink (MDI-II) port of the Switch to any port of the Hub (see figure 4-3).

Using crossover cable

When using crossover cable, the connection can be made from any (1x - 8x) port of the Switch to any port of the Hub (see figure 4-3).

Switch to Switch (other devices)

The Switch can be connected to another switch or other devices (routers, bridges, etc.) via a two-pair Category 3, 4, 5 UTP/STP straight or crossover cable.

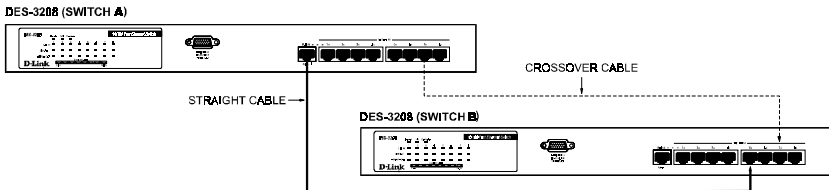


Figure 4-4. DES-3208 Switch to switch connection using the straight OR crossover cable options.

Using straight cable

When using straight cable, this is done from the uplink (MDI-II) port of the Switch (Switch A) to any of the 10 Mbps or 100 Mbps (MDI-X) port of the other switch (switch B) or other devices (see figure 4-4).

Using crossover cable

When using crossover cable, this is done from any (MDI-X) port of the Switch (Switch A) to any of the 10 Mbps or 100 Mbps (MDI-X) port of the other switch (switch B) or other devices (see figure 4-4).

Switch A's LED indicators for the respective connected ports are as follows:

- ◆ 100M is ON for 100Mbps, otherwise OFF.
- ◆ Link/Act is ON.
- ◆ FDX/Col depends on the connected switch or other device.

5

SWITCH MANAGEMENT

Local Console Management

Local console management involves the administration of the DES-3208 Switch via a direct connection to the RS-232 DCE console port. From the Main Menu screen of the console program, a Super User or General User (defined in the next chapter) has privilege and access to manage, control and monitor the many functions of the Switch.

The components of the Switch allow them to be part of a manageable network. These components include a CPU, memory for data storage, other related hardware and the SNMP agent firmware. Activities on the Switch can be monitored with these components, while the Switch can be manipulated to carry out specific tasks.

Out-of-Band Management for the Switch is accomplished through a locally connected management terminal to the RS-232 console port. Through this port, a user can set up, monitor, or change the configuration of the Switch.

The Spanning Tree Algorithm (STA) provides the capability for the Switch to operate properly with other Bridges in a SNMP network supporting the STA. Using the STA, the network will prevent network loop, and automatically establish and activate a backup path in the event of a path failure.

Console port (RS-232 DCE)

Out-of-band management requires connecting a PC (with a SNMP management platform) to the RS-232 DCE console port of the Switch. Switch management using terminal emulation/ VT100 when connected to the RS-232 DCE console port is called *Local Console Management* to differentiate it from management done via management platforms.

The console port is set for the following configuration:

- ◇ Baud rate: 9,600
- ◇ Parity: none
- ◇ Data width: 8 bits
- ◇ Stop bits: 1

IP Addresses and SNMP Community Names

Each Switch has its own IP Address, which is used for communication with an SNMP network manager or other TCP/IP application (for example BOOTP, TFTP). You can change the default Switch IP Address to meet the specification of your networking address scheme.

In addition, you can also set in the Switch an IP Address for a gateway or a router. It is useful when the network management station is not located on the same network as the Switch, making it necessary for the Switch to go through a gateway or router to reach the network manager.

For security, you can set in the Switch a list of IP Addresses of the network managers that you allow to manage the Switch. You can also change the default Community Name in the Switch and set access rights of these Community Names.

Traps

Trap managers are special users of the network who are given certain rights and access in overseeing the maintenance of the network. Trap managers can receive traps sent from the Switch; they must immediately take certain actions to avoid future failure or breakdown of the network.

Traps are messages that alert you of events that occur on the Switch. The events can be as serious as a reboot (someone accidentally turned OFF the Switch), or less serious like a port status change. The Switch generates traps and sends them to the network manager (trap managers). The following lists the types of events that can take place on the Switch.

- ◇ System resets
- ◇ Errors
- ◇ Status changes
- ◇ Topology changes
- ◇ Operation

You can also specify which network managers may receive traps from the Switch by setting a list of IP Addresses of the authorized network managers.

The following are trap types a trap manager will receive:

- ◆ **Cold Start:** This trap signifies that the Switch has been powered up and initialized such that software settings are reconfigured and hardware systems are rebooted. A cold start is different from a factory reset.
- ◆ **Authentication Failure:** This trap signifies that an addressee (or manager/ user) on the Switch is not a valid user of the Switch and may have entered an incorrect community name.
- ◆ **New Root:** This trap indicates that the Switch has become the new root of the Spanning Tree, the trap is sent by a bridge soon after its

election as the new root. This implies that upon expiration of the Topology Change Timer the new root trap is sent out immediately after the Switch's selection as a new root.

- ◆ **Topology Change:** A Topology Change trap is sent by the Switch when any of its configured ports transitions from the Learning state to the Forwarding state, or from the Forwarding state to the Blocking state. The trap is not sent if a new root trap is sent for the same transition.
- ◆ **Link Change Event:** This trap is sent whenever the link of a port changes from link up to link down or from link down to link up.
- ◆ **Port Partition:** This trap is sent whenever the port state enters the partition mode (or automatic partitioning, port disable) when more than thirty-two collisions occur while transmitting.

MIBs

The information stored in the Switch is known as the Management Information Base (MIB). The Switch uses the standard MIB-II Management Information Base module. Consequently, MIB values inside the Switch can be retrieved from any SNMP-based network manager. In addition to the standard MIB-II, the Switch also supports its own proprietary enterprise MIB as an extended Management Information Base. These MIBs may also be retrieved by specifying the MIB's Object-Identity (OID) at the network manager. MIB values can be either read-only or read-write.

Read-only MIBs variables can be either constants that are programmed into the Switch, or variables that change while the Switch is in operation. Examples of read-only constants are the number of ports and types of ports. Examples of read-only variables are the statistics counters such as the number of errors that have occurred, or how many kilobytes of data have been received and forwarded through a port.

Read-write MIBs are variables usually related to user-customized configurations. Examples of these are the Switch's IP Address, Spanning Tree Algorithm parameters and port status.

If you use a third-party vendors' SNMP software to manage the Switch, a diskette listing the Switch's propriety enterprise MIBs can be obtained by request. If your software provides functions to browse or modify MIBs, you can also get the MIB values and change them (if the MIBs' attributes permit the write operation). This process however can be quite involved, since you must know the MIB OIDs and retrieve them one by one.

Packet Forwarding

The Switch looks at the network configuration to forward packets. This reduces the traffic congestion on the network, because packets, instead of being transmitted to all segments, are transmitted to the destination only. Example: if Port 1 receives a packet destined for Port 2, the Switch transmits that packet through Port 2 only, and transmits nothing through Port 1.

- ◆ **Filtering Database.** A Switch filters frames, i.e., does not relay frames received by a Switch Port to other Ports on that Switch, in order to prevent the duplication of frames. Frames transmitted between a pair of end stations can be confined to LANs that form a path between those end stations.

The functions that support the use and maintenance of filtering database information are:

1. Permanent configuration of reserved addresses.
2. Explicit configuration of static filtering information.
3. Automatic learning of dynamic filtering information through observation of Switched Local Area Network traffic.
4. Aging out of filtering information that has been automatically learned.

5. Calculation and configuration of Switched Local Area Network topology.

Aging Time

The Aging Time is a parameter that affects the auto-learn process of the Switch in terms of the network configuration. Dynamic Entries, which make up the auto-learned-node address, are aged out of the address table according to the Aging Time that you set.

The Aging Time can be from 10 seconds to 1,000,000 seconds. A very long Aging Time can result with the out-of-date Dynamic Entries that may cause incorrect packet filtering/forwarding decisions.

In the opposite case, if the Aging Time is too short, many entries may be aged out soon, resulting in a high percentage of received packets whose source addresses cannot be found in the address table.

Spanning Tree Algorithm

The Spanning Tree Algorithm (STA) in the Switch allows you to create alternative paths (with multiple switches or other types of bridges) in your network. These backup paths are idle until the Switch determines that a problem has developed in the primary paths. When a primary path is lost, the Switch providing the alternative path will automatically go into service with no operator intervention. This automatic network reconfiguration provides maximum uptime to network users. The concept of the Spanning Tree Algorithm is a complicated and complex subject and must be fully researched and understood. Please read the following before making any changes .

◆ Network loop detection and prevention.

With STA, there will be only one path between any two LANs. If there is more than one path, forwarded packets will loop indefinitely. STA detects any looped path and selects the path with the lowest path

cost as the active path, while blocking the other path and using it as the backup path.

◆ **Automatic topology re-configuration.**

When the path for which there is a backup path fails, the backup path will be automatically activated, and STA will automatically re-configure the network topology.

STA Operation Levels

STA operates on two levels: the bridge level and the port level. On the bridge level, STA calculates the Bridge Identifier for each Switch, then sets the Root Bridge and the Designated Bridges. On the port level, STA sets the Root Port and Designated Ports. Details are as follows:

On the Bridge Level

- ◆ **Root Bridge:** The Switch with the lowest Bridge Identifier is the Root Bridge. Naturally, you will want the Root Bridge to be the best Switch among the Switches in the loop to ensure the highest network performance and reliability.
- ◆ **Bridge Identifier:** This is the combination of the Bridge Priority (a parameter that you can set) and the MAC address of the Switch. Example: 4 00 80 C8 00 01 00, where 4 is the Bridge Priority. A lower Bridge Identifier results in a higher priority for the Switch, and thus increases its probability of being selected as the Root Bridge.
- ◆ **Designated Bridge:** From each LAN segment, the attached Bridge that has the lowest Root Path Cost to the Root Bridge is the Designated Bridge. It forwards data packets for that LAN segment. In cases where all Switches have the same Root Path Cost, the Switch with the lowest Bridge Identifier becomes the Designated Bridge.

- ◆ **Root Path Cost:** The Root Path Cost of a Switch is the sum of the Path Cost of the Root Port and the Root Path Costs of all the Switches that the packet goes through. The Root Path Cost of the Root Bridge is zero.
- ◆ **Bridge Priority:** This is a parameter that users can set. The smaller the number you set, the higher the Bridge Priority is. The higher the Bridge Priority, the better the chance the Switch will be selected as the Root Bridge.

On the Port Level

- ◆ **Root Port:** Each Switch has a Root Port. This is the port that has the lowest Path Cost to the Root Bridge. In case there are several such ports, then the one with the lowest Port Identifier is the Root Port.
- ◆ **Designated Port:** This is the port on each Designated Bridge that is attached to the LAN segment for which the Switch is the Designated Bridge.
- ◆ **Port Priority:** The smaller this number, the higher the Port Priority is. With higher Port Priority, the higher the probability that the port will be selected as the Root Port.
- ◆ **Path Cost:** This is a changeable parameter and may be modified according to the STA specification. The 100Mbps segment has an assigned Path Cost of 10, and each 10Mbps segment has an assigned Path Cost of 100, based on the STA specifications.

User-Changeable Parameters

The factory default setting should cover the majority of installations. However, it is advisable to keep the default settings as set at the factory; unless, it is absolutely necessary. The user changeable parameters in the Switch are as follows:

- ◆ **Bridge Priority.** A Bridge Priority can be from 0 to 65535. 0 is equal to the highest Bridge Priority.
- ◆ **Bridge Hello Time.** The Hello Time can be from 1 to 10 seconds. This is the interval between two transmissions of BPDU packets sent by the Root Bridge to tell all other Switches that it is indeed the Root Bridge. If you set a Hello Time for your Switch, and it is not the Root Bridge, the set Hello Time will be used if and when your Switch becomes the Root Bridge.

Note that the Hello Time cannot be longer than the Max. Age. Otherwise, a configuration error will occur.

- ◆ **Bridge Max. Age.** The Max. Age can be from 6 to 40 seconds. At the end of the Max. Age, if a BPDU has still not been received from the Root Bridge, your Switch will start sending its own BPDU to all other Switches for permission to become the Root Bridge. If it turns out that your Switch has the lowest Bridge Identifier, it will become the Root Bridge.
- ◆ **Bridge Forward Delay.** The Forward Delay can be from 4 to 30 seconds. This is the time any port on the Switch spends in the listening state while moving from the blocking state to the forwarding state.

Observe the following formulas when you set the above parameters:

1. Max. Age • 2 x (Forward Delay - 1 second)
 2. Max. Age • 2 x (Hello Time + 1 second)
- ◆ **Port Priority:** A Port Priority can be from 0 to 255. The lower the number, the greater the probability the port will be chosen as the Root Port.

Illustration of STA

A simple illustration of three Bridges (or the Switch) connected in a loop is depicted in *Figure 5-1*. In this example, you can anticipate some major network problems if the STA assistance is not applied. For instance, if Bridge 1 broadcasts a packet to Bridge 2, Bridge 2 will broadcast it to Bridge 3, and Bridge 3 will broadcast it to Bridge 1...and so on. The broadcast packet will be passed indefinitely in a loop, causing a serious network failure.

To alleviate network loop problems, STA can be applied as shown in *Figure 5-2*. In this example, STA breaks the loop by blocking the connection between Bridge 1 and 2. The decision to block a particular connection is based on the STA calculation of the most current Bridge and Port settings. Now, if Bridge 1 broadcasts a packet to Bridge 3, then Bridge 3 will broadcast it to Bridge 2 and the broadcast will end there.

STA setup can be somewhat complex. Therefore, you are advised to keep the default factory settings and STA will automatically assign root bridges/ports and block loop connections. However, if you need to customize the STA parameters, refer to *Table 5-1*.

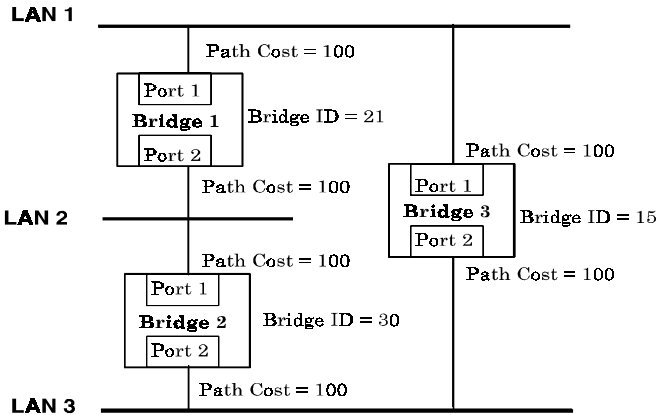


Figure 5-1. Before Applying the STA Rules

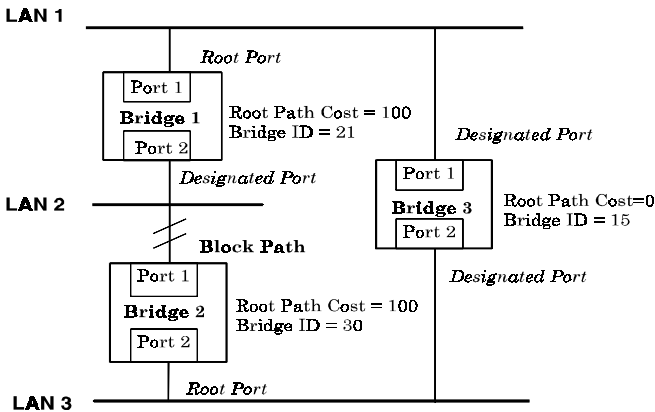


Figure 5-2. After Applying the STA Rules

STA parameters	Settings	Effects	Comment
Bridge Priority	lower the #, higher the priority	Increases chance of becoming the Root Bridge	Avoid, if the switch is used in workgroup level of a large network
Hello Time	1 - 10 sec.	No effect, if not Root Bridge	Never set greater than Max. Age Time
Max. Age Time	6 - 40 sec.	Compete for Root Bridge, if BPDU is not received	Avoid low number for unnecessary reset of Root Bridge
Forward Delay	4 - 30 sec.	High # delays the change in state	Max. Age $\leq 2 \times$ (Forward Delay - 1) Max. Age $\geq 2 \times$ (Hello Time + 1)
Port Level STA parameters			
Enable / Disable	Enable / Disable	Enable or disable this LAN segment	Disable a port for security or problem isolation
Port Priority	lower the #, higher the priority	Increases chance of become Root Port	

Table 5-1. User-selective STA parameters

6

USING THE CONSOLE INTERFACE

Your 10/100 Fast Ethernet Switch supports a console management interface that allows you to set up and control your Switch, either with an ordinary terminal (or terminal emulator), or over the network using the TCP/IP **TELNET** protocol. You can use this facility to perform many basic network management functions. In addition, the console program will allow you to set up the Switch for management using D-View, SNMP-View or another SNMP-based network management system. This chapter describes how to use the console interface to access the Switch, change its settings, and monitor its operation.

Connecting to the Switch

You can use the console interface by connecting the Switch to a VT100-compatible terminal or a computer running an ordinary terminal emulator program (e.g., the **terminal** program included with the Windows operating system) using an RS-232C serial cable. Your terminal parameters will need to be set to:

- ◆ VT-100/ANSI compatible
- ◆ Arrow keys enabled

- ◆ 9,600 baud
- ◆ 8 data bits
- ◆ No parity
- ◆ One stop bit

You can also access the same functions over a **TELNET** interface. Once you have set an IP address for your Switch, you can use a **TELNET** program (in a VT-100 compatible terminal mode) to access and control the Switch. All of the screens are for the most part identical, whether accessed from the console port or from a **TELNET** interface.

Console Usage Conventions

The console interface makes use of the following conventions:

1. Items after a colon ":" are read-only values, displayed for information purposes. The cursor cannot be moved to these items.
2. Items in *<angle brackets>* can be toggled on or off using the space bar.
3. Items in *[square brackets]* can be changed by typing in a new value. You can use the backspace and delete keys to erase characters behind and in front of the cursor.
4. The up and down arrow keys, the left and right arrow keys, the tab key and the backspace key, can be used to move between selected items. It is recommended that you use the *tab key* and *backspace key* for moving around console.
5. Items in UPPERCASE are commands. Moving the selection to a command and pressing Enter will execute that command, e.g. SAVE, EXIT, etc.

First Time Connecting To The Switch

The Switch supports user-based security that can allow you to prevent unauthorized users from accessing the Switch or changing its settings. This section tells how to log onto the Switch.

Note: The passwords used to access the Switch are case sensitive; therefore, "S" is not the same as "s."

When you first connect to the Switch, you will be presented with **the first login screen** (shown below). **Press Ctrl+R (hold down the Ctrl key, press the R key, and release both keys) to call up the screen, if the first login screen does not appear. Also Ctrl+R can be used at any time to refresh the screen.**

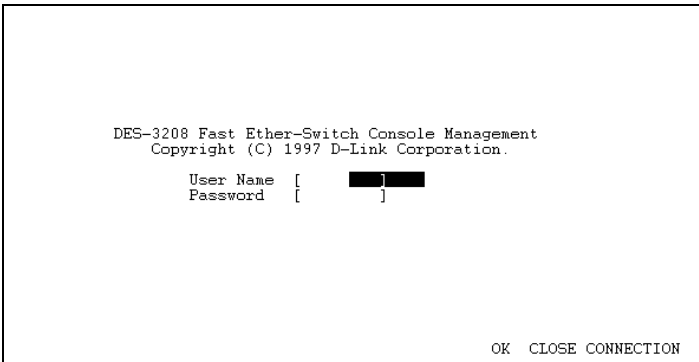


Figure 6-1. Initial Screen, first time connecting to the Switch

Move the cursor to OK and press Enter (Note: *Leave the User Name and Password fields blank*). You will see the **Main Menu** shown below:


```
DES-3208 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration
System Reset
Software Update
Factory Reset NV-RAM to Default Value

HELP LOGOFF
```

Figure 6-2. Main Menu for Super User

The first user automatically gets super user privileges (See *Table 6-1*) and is recommended to create at least one Super User for the Switch.

Steps to create a Super User or General User:

From the screen above, move the cursor to the **User Account Change** and press Enter, then the **User Account Change Menu** appears.

1. Choose **Create New User** from the **User Account Change Menu** and the **Create New User Menu** appears.
2. Enter the new user name, and assign an initial password. Determine whether the new user should have **Super User** or **General User** privileges.
3. Choose **SAVE** and press **Enter** to let the user addition take effect.
4. Choose **EXIT** to leave the **Create New User menu**.

Super and General User Privileges

There are two levels of user privileges: *Super User* and *General User*. Some menu selections available to users with *Super User* privileges may not be

available to *General Users*. The main menus shown are the menus for users with *Super User* and *General User* privileges:

```

DES-3208 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration
System Reset
Software Update
Factory Reset NV-RAM to Default Value

HELP LOGOFF
    
```

Figure 6-3. Main Menu for Super User

```

DES-3208 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration

HELP LOGOFF
    
```

Figure 6-4. Main Menu for General User

The following table summarizes Super User and General User privileges:

Menu	Super User	General User
	Privilege	

Menu	Super User	General User
	Privilege	
System Config.	Yes	Yes, view only.
TCP/IP Parameter Configuration	Yes	Yes, view only.
Statistic Counters	Yes	Yes .
Port Configuration	Yes	Yes, view only.
Spanning Tree Algorithm Parameters		
Forwarding Table	Yes	Yes, view only.
Custom Filtering Table	Yes	Yes, view only.
Protocol Parameters	Yes	Yes, view only.
STAP Port Parameters	Yes	Yes, view only.
Out-of-Band/ Console Configuration	Yes	Yes, view only.
User Account Change		
Create New User	Yes	No
Change Access/ Delete Users	Yes	No
Change Password	Yes	Yes
SNMP Trap Manager Configuration	Yes	Yes, view only.
SNMP Manager Config.	Yes	Yes, view only.
System Reset	Yes	No
Software Update	Yes	No
Factory Reset NV-RAM to Default Value	Yes	No

Table 6-1. Super User and General User Privileges

establishing a **Super User**, you are now ready to operate the Switch. Now issue a **LOGOFF** command from the main menu, the login screen¹ appears as follows.

LOGIN ON THE SWITCH CONSOLE BY REGISTERED USERS

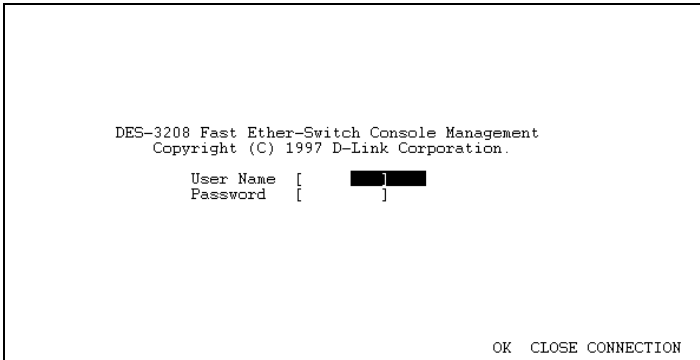


Figure 6-5. Login Screen

To log in,

1. Type in your user name and press Enter.
2. Type in your password and press Enter.

¹ If the Switch is not used within five (5) minutes, the following message appears at the bottom of the console's main menu: "Console time out press ENTER to continue..." At this time, press ENTER and login screen will be displayed.

3. With the cursor on the OK selection, press Enter. The main menu screen will be displayed based on your Super User or General User access level or privilege.

The following describes the differences between the user privileges.

Changing Your Password

To change your user password:

1. Choose **User Account Change** from the main menu.
2. Choose **Change Password**.

```
User Account Change Menu - Change Password

User Name      [ ██████████ ]
Old Password   [          ]
New password   [          ]
Confirm Password [          ]

                                SAVE   EXIT
```

Figure 6-6. Change Password

3. Type in your **user name** and press Enter.
4. Type in your **old password** and press Enter.
5. Type in the new password you have chosen, and press Enter. Type in the same new password in the following blank to verify that you have not mistyped it.
6. Choose the SAVE command to let the password change take effect.

7. Choose EXIT to exit this screen.

This method can also be used by a *Super User* to change another user's password.

Adding and Deleting Users

Access to the console, whether using the console port or via **TELNET**, is controlled using a user name and password. Up to three of these user names can be defined. The console interface will not let you delete the current logged-in user, however, in order to prevent accidentally deleting all of the users with *Super User* privilege.

Only users with the *Super User* privilege can add new and delete users.

Adding a New User

To add a new user:

1. Choose **User Account Change** from the main menu.

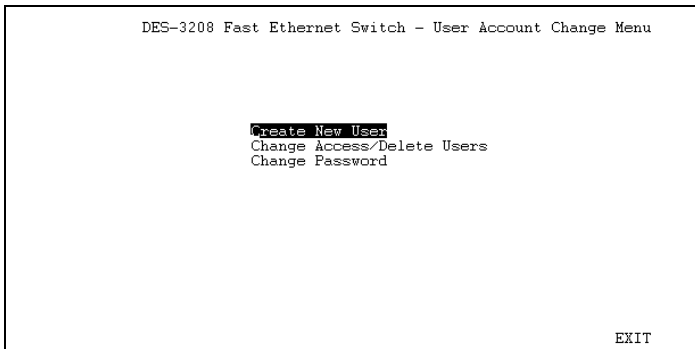


Figure 6-7. User Account Change Menu

2. Choose **Create New User** from the User Account Change menu.

3. Enter the new user name, and assign an initial password. Determine whether the new user should have *Super User* or *General User* privileges.

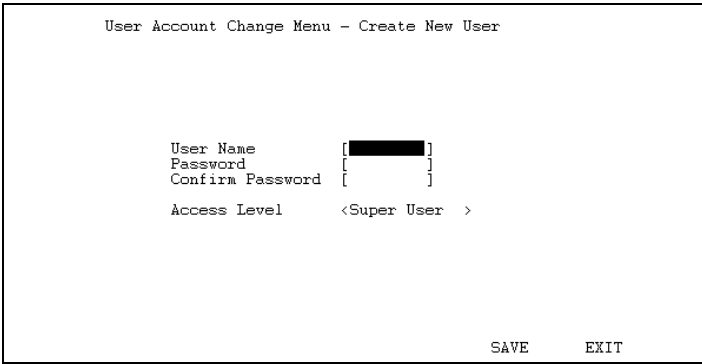


Figure 6-8. Adding a New User

4. Choose SAVE and press Enter to let the user addition take effect.
5. Choose EXIT to leave the Create New User menu.

Deleting a User

To delete a user,

1. Choose **User Account Change** from the main menu.
2. Choose **Delete Users** from the User Account Change menu.
3. Toggle the Delete field of the user you wish to remove to Yes.

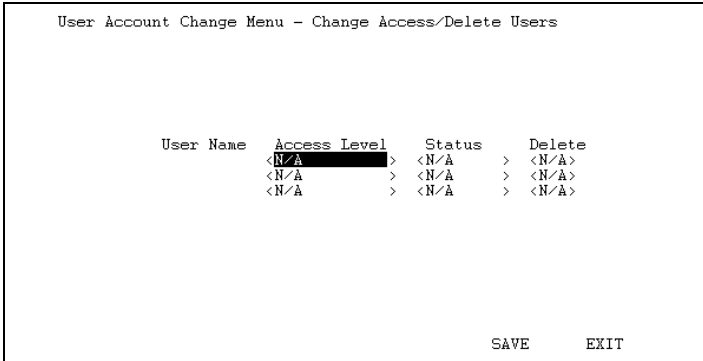


Figure 6-9. Deleting a User

4. Choose SAVE and press Enter to let the user addition take effect.
5. Choose EXIT to leave the Delete Users menu.

Setting up the Switch

This section describes the settings you will need to change to allow you to be able to manage the Switch from an SNMP-based Network Management System such as D-View, SNMP-View, or to be able to access the Switch using the **TELNET** protocol.

TCP/IP Settings

The Switch needs to have a TCP/IP address assigned to it so that the network management system or **TELNET** client can find it on the network. The **TCP/IP Parameters Configuration** menu allows you to change the settings for the two different interfaces used on the Switch: the Ethernet interface

used for in-band communication, and the SLIP interface used over the console port for out-of-band communication.

Each of the fields on this menu takes effect the next time the system is restarted. Fields that can be set include:

- ◆ **IP Address:** determines the IP address used by the Switch for receiving SNMP and **TELNET** communications. Should be of the form *xxx.xxx.xxx.xxx*, where each *xxx* is a number (represented in decimal) between 0 and 255. This address should be a unique address on a network assigned to you by the central Internet authorities. The same IP address is shared by both the SLIP and Ethernet network interfaces.
- ◆ **Subnet Mask:** bitmask that determines the extent of the subnet that the Switch is on. Should be of the form *xxx.xxx.xxx.xxx*, where each *xxx* is a number (represented in decimal) between 0 and 255. If no subnetting is being done, the value should be 255.0.0.0 for a Class A network, 255.255.0.0 for a Class B network, and 255.255.255.0 for a Class C network.
- ◆ **Default Gateway:** IP address that determines where frames with a destination outside the current subnet should be sent. This is usually the address of a router or a host acting as an IP gateway. If your network is not part of an internetwork, or you do not want the Switch to be accessible outside your local network, you can leave this field blank.
- ◆ **Send BOOTP Request Upon Power Up:** determines whether the Switch should send out a BOOTP broadcast request when it is powered up. The BOOTP protocol allows IP addresses, network masks, and default gateways to be assigned on a central BOOTP server; if this option is set the Switch will first look for a BOOTP server to provide it with this information before using the supplied settings.

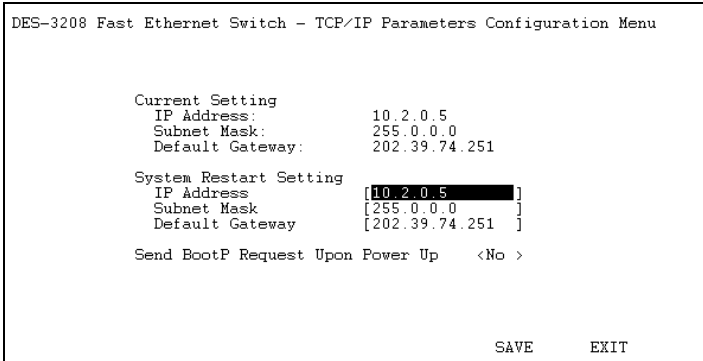


Figure 6-10. TCP/IP Parameters Configuration Menu

Out-of-band management and console settings

You can use the **Out-of-Band/Console Setting** menu to choose whether to use the Switch's RS-232C serial port for console management or for out-of-band TCP/IP communications using SLIP, and to set the bit rate used for SLIP communications.

The following fields can be set:

System Restart Setting:

- ◆ **Serial Port Type:** determines whether the serial port should be used for out-of-band (SLIP) management or for console management, starting from the next time the Switch is restarted. In this field, you can toggle between **Out-of-band** or **Console** port type settings.
- ◆ **Out-of-Band Baud Rate:** determines the serial port bit rate that will be used the next time the Switch is restarted. Applies only when the serial port is being used for out-of-band (SLIP) management; it does not apply when the port is used for the console port. Available speeds are 2400, 9600, 19200 and 38,400 bits per second..

```

DES-3208 Fast Ethernet Switch - Out of Band /Console Configuration

Out-of-Band Setting          Console Setting
Baud Rate: 9600              Baud Rate: 9600
Character Size: 8            Character Size: 8
Stop Bit: 1                  Stop Bit: 1

Current Setting
Serial Port Type:           Console

System Restart Setting
Serial Port Type            <Console >
Out-of-Band Baud Rate      <9600 >

SAVE      EXIT

```

Figure 6-11. Out-of-Band/Console Setting Menu

Software Updates

The Switch is capable of obtaining its boot-time configuration information, as well as updated versions of its internal firmware, using TFTP (the Trivial File Transfer Protocol) and BOOTP (the BOOTstrap Protocol). You can use the Software Update menu to control this feature.

The fields you can set in this menu are:

- ◆ **Software Update** Determines whether or not the Switch will try to look for a configuration file over the network. If set to Disable, none of the fields below have any effect.
- ◆ **Software Update Mode** Set to either **Network** or **Out-of-band**. Determines whether the configuration file should be obtained through the Ethernet network or through the console port.
- ◆ **Boot Protocol:** Set to either TFTP ONLY or BOOTP&TFTP. Applies only if the *Software Update* is set to enabled.
- ◆ **Boot Server IP Address:** The IP address of the TFTP server where the configuration file is located. This entry is used only if the Software Update is set to enabled and your boot protocol is **tftp**

only. If you are using **bootp-tftp** mode, or if *Send BOOTP Request on Power Up* (see TCP/IP Parameters Configuration Menu) is set to “Yes,” the address will be obtained from the BOOTP server.

- ◆ **Boot File Name:** The pathname of the configuration file on your TFTP server. This entry is used only if your boot protocol is TFTP ONLY; if you are using BOOTP&TFTP mode, the pathname will be obtained from the BOOTP server.

```
DES-3208 Fast Ethernet Switch - Software Update

Software Update          <Disable>
Software Update Mode    <Network  >

Boot Protocol            <BOOTP&TFTP>
Boot Server IP Address   [10.1.1.1  ]
Boot File Name           [\des3208.cfg ]
Last Boot Server IP Address: 10.1.1.1

                                     SAVE   EXIT
```

Figure 6-12. Software Update Menu

System Configuration Menu

The System Configuration Menu screen shows various pieces of information about your Switch, and allows you to set the System Name, System Location, and System Contact. These settings can be retrieved from the Switch using SNMP requests, allowing these settings to be used for network management purposes. Each of these fields can contain up to 64 characters:

- ◆ **System Name:** corresponds to the SNMP MIB II variable **system.sysName**, and is used to give a name to the Switch for administrative purposes. The Switch’s fully qualified domain name is often used, provided a name has been assigned.

- ◆ **System Location:** corresponds to the SNMP MIB II variable **system.sysLocation**, and is used to indicate the physical location of the Switch for administrative purposes.
- ◆ **System Contact:** corresponds to the SNMP MIB II variable **sysContact**, and is used to give the name and contact information for the person responsible for administering the Switch.

```
DES-3208 Fast Ethernet Switch - System Configuration Menu

Boot PROM Firmware Version:  1.15
Software Version:            1.01
Hardware Version:            1.00
MAC Address:                  00:80:C8:02:00:04

System Description:
  D-Link Fast Ethernet Switch
System Name [DES-3208]
System Location [ ]
System Contact [D-Link Technical Support.]
Console/Telnet Display Timeout in Minutes(1-32767) [5 ]

                                     SAVE      EXIT
```

Figure 6-13. System Configuration Menu

The System Configuration Menu also contains the **Console/Telnet Display Timeout** parameter, which determines how long the console may sit idle before the user is automatically “logged out.”

SNMP Management Settings

SNMP Trap Manager Configuration

The Switch sends out SNMP *traps* to network management stations whenever certain exceptional events occur, such as when the Switch is turned

on or when a system reset occurs. The Switch allows traps to be routed to up to four different network management hosts.

For a detail list of Trap Types used for this Switch, see *Chapter 5, Switch Management, Traps* section.

```
DES-3208 Fast Ethernet Switch - SNMP Trap Manager Configuration

IP Address          SNMP Community String      Status
[██████████] [          ] ] <Invalid>
[          ] [          ] ] <Invalid>
[          ] [          ] ] <Invalid>
[          ] [          ] ] <Invalid>

SAVE      EXIT
```

Figure 6-14. SNMP Trap Manager Configuration Menu

The following trap parameters can be set:

- ◆ **IP Address:** gives the IP address of the network management station to receive the trap.
- ◆ **SNMP Community String:** determines the SNMP community name to be included in the trap request.
- ◆ **Status:** determines whether this trap entry is valid or invalid. You can delete an entry by changing its status to Invalid.

SNMP Manager Configuration

SNMP Security (Community Names)

SNMP (version 1) implements a rudimentary form of security by requiring that each request includes a *community name*. A community name is an arbitrary string of characters used as a “password” to control access to the Switch. If the Switch receives a request with a community name it does not recognize, it will trigger an authentication trap.

The SNMP allows up to four different community names to be defined. The community name **public** is defined by default; you can change this name in addition to adding others. You will need to coordinate these names with the community name settings you use in your network management system.

The following SNMP Manager Configuration parameters can be set:

- ◆ **Access Rights:** allows each community to be separately set to either *read only* or *read/write*.
- ◆ **Status:** determines whether this SNMP Community name entry is valid or invalid.

```

DES-3208 Fast Ethernet Switch - SNMP Manager Configuration

SNMP Community String      Access Right      Status
[public]                   ] <Read/Write>    <Valid  >
[                           ] <Read Only >   <Invalid>
[                           ] <Read Only >   <Invalid>
[                           ] <Read Only >   <Invalid>

                                     SAVE   EXIT
  
```

Figure 6-15. SNMP Manager Configuration

Port Configuration

The port configuration menu allows you to change the port state in the case when you would like to partition a port due to excessive collision, or for observation, device repair, security reasons. Great caution, however, must be observed when partitioning a port; you should make sure that the partitioned port is not being used as the port to control or monitor the condition of other devices.

To change the configuration of a port:

1. Choose **Port Configuration** from the main menu.
2. Specify the port in the *Port(1-8)* field.
3. In the *Port State* field, change the port state to enable or disable.
4. Choose SAVE and press Enter to let the changes take effect.
5. Choose EXIT and hit the enter key to leave the Port Configuration menu.

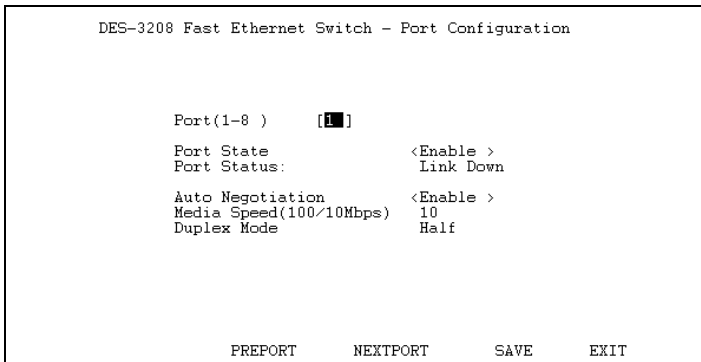


Figure 6-16. Port Configuration Menu

Port Status, Media Speed (10/100Mbps) and Duplex Mode reflect the current conditions of the port and are read-only fields and cannot be changed.

Previously made modifications should be noticed the next time upon entering the Port Configuration menu.

You can use the PREPORT and NEXTPORT commands to view and modify the previous port and next port, respectively, as you wish.

Switch Monitoring

The Switch allows you to keep statistics on the operation of each port. The statistics obtained can be used to monitor the conditions and general efficiency of the Switch.

Displaying Port Statistics

The display permits you to observe the condition of each individual port.

To display Statistic Counters:

1. Choose **Statistic Counters** from the main menu.
2. Enter the desired port in the *Port(1-8)* field.
3. Choose EXIT to leave the Statistic Counters menu.

Use the PREPORT and NEXTPORT command to observe conditions on the previous port and next port, respectively. The CLEAR COUNTER command clears all counters **on the current port** to zero. This command, however, does not terminate or reset the statistic counters on the other ports, only the currently displayed port.

DES-3208 Fast Ethernet Switch - Statistics Counters						
Port(1-8)	[0]	Frames	Frames/Sec	Frames	Frames/Sec	
MAC Rx Errors:	0	0		Multicast Rx:	517	1
CRC Errors:	0	0		Broadcast Rx:	18387	85
Oversize Frames:	0	0		Rx(Good):	19033	88
Fragments:	1211	7		Tx(Good):	25	0
Jabber:	0	0		64 Octs:	3512	21
Collisions:	0	0		65-127 Octs:	9599	59
Late Collisions:	0	0		128-255 Octs:	5889	9
				256-511 Octs:	2601	11
				512-1023 Octs:	9	1
				1024-1522 Octs:	64	0
Bytes Tx:	6823	163		Total Frames Rx:	22860	110
Bytes Rx:	3536243	13803				
Total Bytes Rx:	3823148	16238				
		PREPORT	NEXTPORT	CLEAR COUNTER	EXIT	

Figure 6-17. Statistics Counters

The statistic counters displayed are defined as follows:

- ◆ **MAC Rx Errors (MAC Received Errors):** The number of frames with received MAC Errors (assertion of RXEr).
- ◆ **CRC Errors:** The number of frames with valid packet length and misalignment (or odd number of nibbles).
- ◆ **Oversize Frames:** The number of good frames with length greater than 1518 bytes and therefore are greater than the maximum legal length.
- ◆ **Fragments:** The number of good frames with length less than the 64-byte (octet) minimum defined by the Ethernet standard. These are usually caused by collisions.
- ◆ **Jabber:** The number of frames with length more than 1518 bytes and with CRC error or misalignment (bad framing).
- ◆ **Collisions:** The number of collision errors.
- ◆ **Late Collisions:** The number of collisions that occur at or after the 64th byte (octet) in the frame.

- ◆ **Bytes Tx (Bytes Sent):** The number of good bytes sent from the respective port.
- ◆ **Tx (Good) (Frames Sent):** The number of good frames sent from the respective port.
- ◆ **Bytes Rx (Bytes Received):** The number of good bytes received. This also includes local and dropped packets.
- ◆ **Rx (Good) (Frames Received):** The number of good frames received. This also includes local and dropped packets.
- ◆ **Total Bytes Rx (Total Bytes Received):** The number of bytes received ---- good and bad.
- ◆ **Multicast Rx (Multicast Frames Received):** The number of good multicast frames received. This includes local and dropped multicast packets.
- ◆ **Broadcast Rx (Broadcast Frames Received):** The number of good broadcast frames received. This includes local and dropped broadcast packets.
- ◆ **64 Octs, 65-127 Octs, 128-255 Octs, 256-511 Octs, 512-1023 Octs, 1024-1518 Octs:** The number of good frames of various length ranges, both valid and invalid.
- ◆ **Total Frames Rx (Total Frames Received):** The number of frames received --- good and bad.

Spanning Tree Algorithm Parameters

The Spanning Tree Algorithm Parameters can be used for creating alternative paths in your network. This section will guide you through the steps

involved in changing the parameters in the Spanning Tree Algorithm. However, before changing any of the parameters in the Protocol Parameters or STAP Port Parameters, please read *Chapter 5's, Spanning Tree Algorithm* and become familiar with the complex aspects of the STA. It is recommended that you leave these parameters as they are. If you, however, must change them follow the steps in this section, which covers: the Forwarding Table, Custom Filtering Table, Protocol Parameters, and STAP Port Parameters.

Forwarding Table

The Forwarding Table displays the list of MAC address entries obtained from the Switch. It represents a table that contains information about unicast entries for which the Switch has forwarding and/or filtering information.

- ◆ **Age Time:** The age time is in seconds with 300 seconds being the default value and has a range from 30 to 1,000,000 seconds. See the *Age Time* section, in chapter 5, *Switch Management*.
- ◆ Under the **Source Address** heading a total of sixteen (16) addresses will be seen; while, the Source Address list holds a total number of 8,000 entries.
- ◆ Under the **Port** heading a total of sixteen (16) port will be displayed for each corresponding Source Addresses.
- ◆ Under the **Status** heading a total of sixteen (16) status will be displayed for each corresponding Source Addresses. The status of the MAC addresses reflects how the Switch got the address and should show either: (1) Management, (2) Learned or (3) Self. The following explain each status:
 - ◇ **Management:** This status indicates that the MAC address was obtained through the direct entry from a network manager.
 - ◇ **Learned:** This status indicates that the MAC address was obtained from the LAN network.

- ◇ **Self:** This status means that the MAC address was obtained from the Switch *itself*.

To display the Forwarding Table entries:

1. Choose Spanning Tree Algorithm from the main menu.
2. Choose **Forwarding Table** from the Spanning Tree Algorithm menu.
3. In the *Port(1-8)* field, type in the desired port you would like displayed.
4. Choose the PREPAGE command to see the previous page and the NEXTPAGE command to see the next page. Choose EXIT to leave the Forwarding Table.

```

Spanning Tree Algorithm Menu - Forwarding Table
Age out Time (10-1000000 sec)          [300]
Source Address          Port          Status
00:80:C8:02:00:04      0              Self
00:80:C8:16:BA:80      3              Learned

PREPAGE  NEXTPAGE  SAVE  EXIT

```

Figure 6-18. STA, Forwarding Table

Custom Filtering Table

The Custom Filtering Table contains filtering information configured into the Switch by (local or network) management specifying the set of ports to which packets received from specific ports and containing specific destination addresses that are allowed to be forwarded. You can use the Custom Filtering Table for network security purposes thereby aging out or

discarding unwanted addresses from the Forwarding Table; furthermore, you can use it for explicit forwarding by speeding up the process of packet forwarding.

Dynamic Filtering and Static Filtering are among the two important features of the Custom Filtering Table. They are defined here briefly as follows. *Dynamic Filtering* is defined when a dynamic entry is created by the Learning Process as a result of observation of network traffic in the Filtering Database. *Static Filtering* is defined as static entries that may be added and removed from the Filtering Database by the user. They are not automatically removed by any timeout mechanism.

The **Source Address** heading displays a total of ten (10) addresses at a time; while a total of 40 MAC addresses may be inputted for all of the ports. The **Source Port** heading displays the respective port you would like associate with an inputted **Source Address**.

Occasionally you may want to manually add entries to the switch's forwarding table. To add an entry for a station,

1. Choose Spanning Tree Algorithm Parameters from the main menu.
2. Choose Custom Filtering Table.

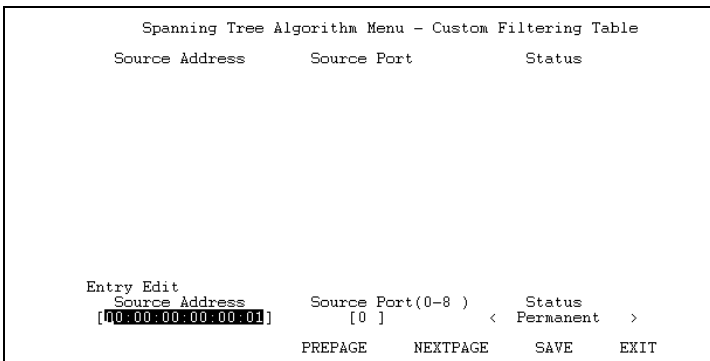


Figure 6-19. Custom Filtering Table

3. In the “**Source Address**” field, enter the Ethernet (MAC) address of the station, in the form `xx:xx:xx:xx:xx:xx`; each `xx` must be a hexadecimal number between `00` and `FF`.
4. In the “**Source Port**” field, type in the port number to which the station is to be connected. For example: the value “1” in this field would represent that the station will be connected to port 1 of this switch; the value “0” would represent that the station can not be connected to any port of the switch, and the switch will filter out all packets from the station.
5. Set the Status of the entry to Permanent in order to enter and save the settings in the memory of the switch.

Choose `SAVE` to add the entry to the forwarding table.

The `PREPAGE` command allows you to see the previous page, and the `NEXTPAGE` command allows you to see the next page.

The following Custom Filtering Table parameters can be set:

- ◆ **Source Address:** This field allows you to input the Source Address. This must be a valid MAC address; you will be immediately notified with the message “Invalid MAC Address!” if you enter an incorrect MAC address.
- ◆ **Source Port:** This field allows you to enter the receive port for a specified Destination Address. For example, if `00:80:C8:12:33:43` constitutes a destination address for receive port no. 3, and the Switch receives this destination address for port no. 5; this destination address will be discarded. However, if you do not want a destination address to be discarded because of lack of recognition, a zero (0) may be used to specify all ports.
- ◆ **Status:** This field allows you to toggle between three choices. It represents the filtering portion of the Switch and determines the

treatment of each destination address upon reception. The following are definitions for status types:

- ◇ **Invalid:** This entry, in all cases, will discard the destination address from the filtering table.
- ◇ **Permanent:** This entry, in all cases, is currently in use and will remain so after the next reset of the Switch. This is the default entry for destination address entry.
- ◇ **Delete On Reset:** This entry is currently in use and will remain so until the next reset of the Switch.

Protocol Parameters

The Protocol Parameters allows you to change the behind the scene parameters of the Spanning Tree Algorithm at the bridge level. The parameters for this section have been fully explained in *Chapter 5, Switch Management*, see *STA Operation Levels: On the Bridge level*, and *User-Changeable Parameters*. It is recommended that you read these sections and/or Chapter 5 first before changing any of the parameters.

To change the Protocol Parameters:

1. Choose Spanning Tree Algorithm from the main menu.
2. Choose **Protocol Parameters** from the Spanning Tree Algorithm menu.
3. Enter the Bridge Max Age in the *Bridge Max Age* field.
4. Enter the Bridge Hello Time in the *Bridge Hello Time* field.
5. Enter the Bridge Forward Delay time in the *Bridge Forward Delay* field.
6. Enter the Bridge Priority in the *Bridge Priority* field.

7. Go to the SAVE command and save the Protocol Parameters.
8. Choose EXIT and hit the enter key to leave the Protocol Parameters.

```

Spanning Tree Algorithm Menu - Protocol Parameters

Spanning Tree Protocol          <Disable>
Time Since Topology Changes (sec): 0
Topology Change Count:         500
Designed Root:                  0000000000000000
Root Cost (Hex):                0
Root Port:                      0
Max Age(sec):                   0
Forward Delay(sec):             0
Hold Time(sec):                 0

Bridge Max Age (6-40 sec)       [0 ]
Bridge Hello Time (1-10 sec)    [0 ]
Bridge Forward Delay (4-30 sec) [0 ]
Bridge Priority (0-0xFFFF)     [8000]

Note: 2*(Forward Delay-1)>=Max Age
      Max Age>=2*(Hello Time+1 second)

                                     SAVE      EXIT

```

Figure 6-21. Protocol Parameters

STAP Port Parameters

The STAP Port Parameters allows you to change the behind the scene parameters of the Spanning Tree Algorithm at the port level. The parameters for this section have been fully explained in Chapter 5, *Switch Management*, see *STA Operation Levels: On the port level*, and *User-changeable parameters*. It is recommended that you read these sections and/or Chapter 5 first before changing any of the parameters.

To change the STAP Port Parameters:

1. Choose Spanning Tree Algorithm from the main menu.
2. Choose **STAP Port Parameters** from the Spanning Tree Algorithm menu.
3. Enter the desired port in the *Port Number* (1-8) field.
4. Enter the desired Port Path Cost in the *Port Path Cost* (1-65535) field.

5. Enter the desired Port Priority in the *Port Priority (0-255)* field.
6. Go to the SAVE command and save the STAP Port Parameters.
7. Choose EXIT to leave the STAP Port Parameters.

The PREPORT command allows you to see the parameters of the previous port, and the NEXTPORT command allows you to see the parameters of the next port

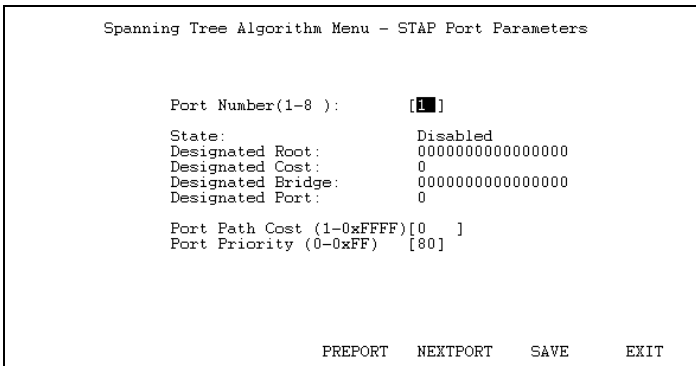


Figure 6-22. STAP Port Parameters

Resetting the Switch

You can use the console interface to reset the Switch stack, either doing a System Reset (which restarts the Switch and is identical to powering the Switch off and back on again) or a Factory Reset (which sets all of the Switch's parameters to what they were when the Switch was delivered from the factory).

System Reset

To perform a System Reset,

1. Choose **System Reset** from the main menu.

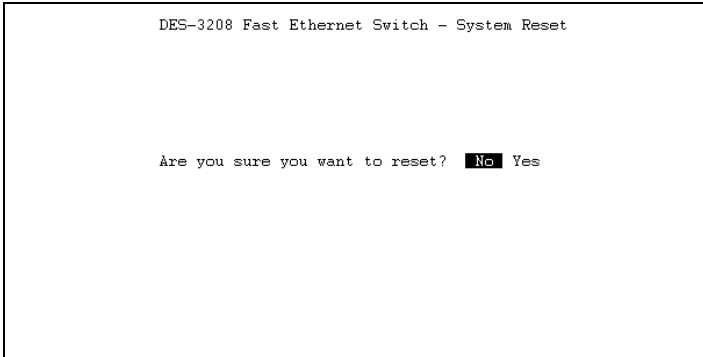


Figure 6-23. System Reset

2. Move the cursor to **Yes** to confirm the reset and press **Enter**. The Switch should restart.

Factory Reset

Before performing a factory reset, be absolutely certain that this is what you want to do. Once the reset is done, all of the Switch's settings stored in NV-RAM (including TCP/IP parameters, SNMP parameters, the enabled/disabled settings of ports, security settings, etc.) will be erased and restored to their factory default settings.

1. Choose **Factory Reset NV-RAM to Default Value** from the main menu.

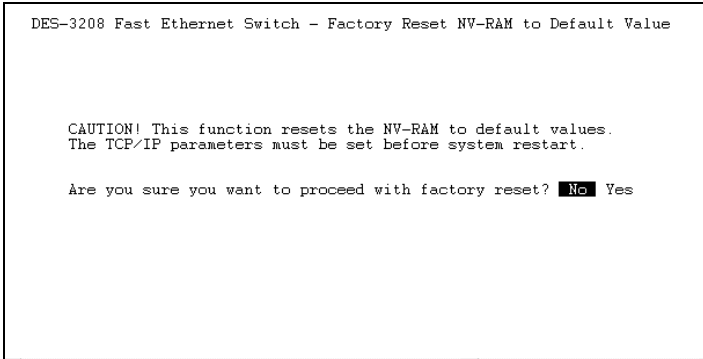


Figure 6-24. Factory Reset

2. Move the cursor to **Yes** to confirm the reset and press Enter.
3. The main menu screen should appear. Move the cursor to the TCP/IP Parameters Configuration Menu and input: the *IP Address*, *Subnet Mask* and *Default Gateway*. The *Send BootP Request Upon Power Up* is an optional field for your response. Using the spacebar, toggle your response in this field at this time.
4. Move the cursor to SAVE and press Enter.
5. Move the cursor to EXIT and press Enter. The Switch should restart, and all of its parameters will be reset to their default values.



TECHNICAL SPECIFICATIONS

General	
Standards:	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100 BASE-TX Fast Ethernet ANSI/IEEE Std 802.3 NWay auto-negotiation IEEE 802.3 Frame types: Transparent IEEE 802.3 MAC layer frame size: 64–1518 bytes
Protocol:	CSMA/CD
Data Transfer Rate:	Fast Ethernet: 100Mbps (half duplex) 200Mbps (full duplex)
Topology:	Star

General

General	
Network Cables:	10BaseT: 2-pair UTP Cat. 3,4,5 (100 m) EIA/TIA- 568 100-ohm STP (100 m) 100Base-TX: 2-pair UTP Cat. 5 (100 m) EIA/TIA-568 100-ohm STP (100 m)
Number of Ports:	8 x 10/100 Mbps NWay ports
Media Interface Exchange:	MDI-II RJ-45 shared with port 1x
Controller Chips	VLSI

Physical and Environmental

Physical and Environmental	
AC inputs:	100 - 240 VAC, 50/60 Hz (internal universal power supply)
Power Consumption:	40 watts maximum
DC fans:	2 built-in 40x40 mm fan
Operating Temperature:	0 ~ 50 degrees Celsius
Storage Temperature:	-40 ~ 70 degree Celsius
Humidity:	5% ~ 95% non-condensing
Dimensions:	324x231x43 mm (1U), 19 inch rack-mount width
Weight:	3 Kg

Physical and Environmental	
EMI:	FCC Class A, CE Mark Class A, VCCI Class A
Safety:	UL (UL 1950), CSA (CSA950), TUV/GS (EN60950)

Performance	
Transmission Method:	Store-and-forward
RAM Buffer:	8 M bytes per device
Filtering Address Table:	8 K entries per device
Packet Filtering/Forwarding Rate:	148,800 pps per port (for 100Mbps)
MAC Address Learning:	Automatic update Max age: fixed

B

RJ-45 PIN SPECIFICATION

When connecting the DES-3208 Switch to another switch, a bridge or a hub, a modified crossover cable is necessary. Please review these products for matching cable pin assignment.

The following diagram and table show the standard RJ-45 receptacle/connector and their pin assignments for the switch-to-network adapter card connection, and the straight/ crossover cable for the Switch-to-switch/hub/bridge connection.

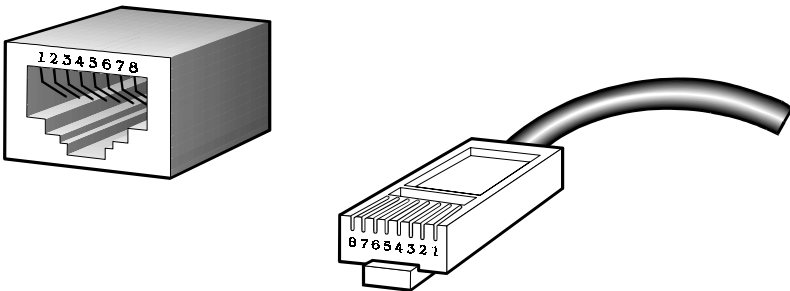


Figure B-1. The standard RJ-45 receptacle/connector

RJ-45 Connector pin assignment	
Contact	Media Direct Interface Signal
1	Tx + (transmit)
2	Tx - (transmit)
3	Rx + (receive)
4	Not used
5	Not used
6	Rx - (receive)
7	Not used
8	Not used

Table B-1. The standard Category 3 cable, RJ-45 pin assignment

The following shows straight cable and crossover cable connection:

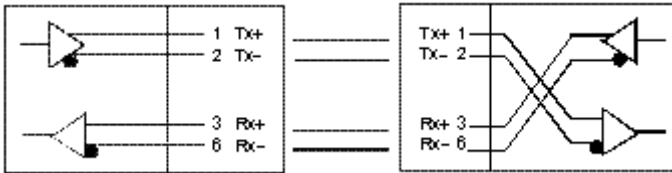


Figure B-2. Straight cable for Switch (uplink MDI-II port) to switch/Hub or other devices connection

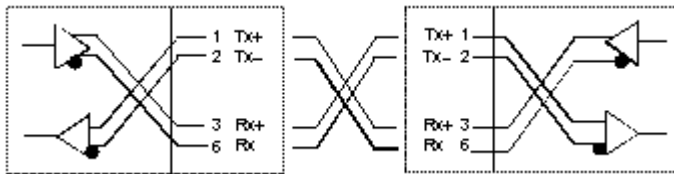


Figure B-3. Crossover cable for Switch (MDI-X port) to switch/hub or other network devices (MDI-X port) connection



MII CONNECTOR SPECIFICATIONS

The MII (Media Independent Interface) is a 40 pin connector used for making connection with other LAN networks. This connector has a shared connection with port 2x, and when connected, the MII connection takes operational precedence over port 2x.

The following Figure and table show the standard MII 40 pin connector and the pin assignment.

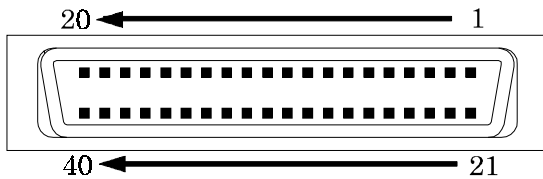


Figure C-1. The Standard MII connector

MII Connector Pin Assignment

Contact	MII Signal	Signal Name	Contact	MII Signal	Signal Name
1	+5 V	Voltage	21	+5 V	Voltage
2	MDIO	MAC Data Input Output	22	---	Ground
3	MDC	MAC Data Clock	23	---	Ground
4	RXD<3>	Receive Data 3 bit	24	---	Ground
5	RXD<2>	Receive Data 2 bit	25	---	Ground
6	RXD<1>	Receive Data 1 bit	26	---	Ground
7	RXD<0>	Receive Data 0 bit	27	---	Ground
8	RX_DV	Receive Data Valid	28	---	Ground
9	RX_CLK	Receive Clock	29	---	Ground
10	RX_ER	Receive Error	30	---	Ground
11	NOT USED	Not Used	31	---	Ground
12	TX_CLK	Transmit Clock	32	---	Ground
13	TX_EN	Transmit Enable	33	---	Ground
14	TXD<0>	Transmit Data 0 bit	34	---	Ground
15	TXD<1>	Transmit Data 1 bit	35	---	Ground
16	TXD<2>	Transmit Data 2 bit	36	---	Ground
17	TXD<3>	Transmit Data 3 bit	37	---	Ground

MII Connector Pin Assignment					
Contact	MII Signal	Signal Name	Contact	MII Signal	Signal Name
18	COL	Collision	38	---	Ground
19	CRS	Carry Sense	39	---	Ground
20	+5 V	Voltage	40	+5 V	Voltage

Table C-1. The MII standard pin assignment

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